

In the Specification:

Please **delete** the heading at **page 1, above line 1.**

Please **add** a new heading at **page 1, above line 1, as follows:**

TITLE OF THE INVENTION

Please **add** a new heading at **page 1, above line 2, as follows:**

FIELD OF THE INVENTION

Please **replace** the paragraph at **page 1, lines 2 to 4,** with a replacement paragraph amended as follows:

The invention relates to an arrangement for measuring the rotational moment or torque ~~measurement~~ of rotating machine ~~parts according to the preamble of the patent claim 1.~~ parts.

Please **add** a new heading at **page 1, above line 5, as follows:**

BACKGROUND INFORMATION

Please **replace** the paragraph at **page 2, line 19 to page 3 line 23,** with a replacement paragraph amended as follows:

An apparatus for the transmission of measurement signals via a transmitter from a rotor side to a stator side, and for the transmission of a supply voltage via the same transmitter from the stator side to the rotor side is known from the DE patent 28 46 583. The transmitter consists of a stationary winding connected with the stator and a

rotatable winding connected with the rotor. The two windings are inductively coupled via an air gap. The supply voltage for a circuit that is connected with the rotor and that contains a measured value pick-up or sensor is produced in that the alternating voltage produced with the stator-side oscillator is supplied via the transmitter to a rotor-side rectifier with a stabilizer connected in circuit downstream from the rectifier. The measurement signal of the measured value pick-up is, after amplification, converted into a pulse train by a voltage-frequency converter, of which the output stage is connected to the rotor-side winding of the transmitter. The signal is tapped from a high-ohmic or high-resistance point of the stator side, and is provided to a demodulator. The output signal thereof corresponds to that of the voltage-frequency converter, that is to say a low frequency corresponds to a small measurement signal and a high frequency corresponds to a large measurement signal. Such voltage-frequency converters represent a function generator with controllable frequency, which ~~consist~~ consists of circuit-connected operational amplifiers with RC-elements, which comprise temperature dependent zero or null point and sensitivity errors as well as long-term drift due to aging. Especially in connection with a frequency modulation of middle frequencies above 100 kHz interferences arise in the form of a small time shift or offset in the receiver, which cause, as so-called signal-jitter, errors in the analog measurement signal.

Please **add** a new heading at **page 3, above line 24**, as follows:

SUMMARY OF THE INVENTION

Please **replace** the paragraph at **page 4, lines 4 to 7**, with a replacement paragraph amended as follows:

This object is achieved by the invention ~~set forth in the patent claim 1. Further developments and advantageous example embodiments of the invention are set forth in the dependent claims.~~ in an arrangement for the torque measurement of rotating machine parts with a strain measuring bridge arranged on the rotor, the output signals of which strain measuring bridge are amplified and converted in a synchronous voltage-frequency converter into a frequency-proportional signal and are transmitted by means of a transmitter circuit to a stator, with a follow-up PLL synchronization circuit connected after the converter for suppressing the so-called frequency jitter.

Please **replace** the paragraph at **page 4, lines 18 to 23**, with a replacement paragraph amended as follows:

In a particular embodiment of the invention with a high-frequency quartz-controlled modulation frequency, it is advantageous that thereby the transmission of interference frequencies ~~[[are]]~~ is avoidable through filter circuits, which would otherwise lie in the range of the transmittable signal bandwidths and could falsify these measurement signals.

Please **add** a new heading at **page 5, above line 6**, as follows:

BRIEF DESCRIPTION OF THE DRAWINGS

Please **replace** the paragraph at **page 5, lines 9 to 10**, with a replacement paragraph amended as follows:

Fig. 1: a schematic illustration of a signal processing circuit for the frequency conversion, ~~[[and]]~~

Please **replace** the paragraph at **page 5, lines 11 to 13**, with a replacement paragraph amended as follows:

Fig. 2: a schematic illustration of a signal processing circuit for the frequency conversion with a frequency ~~divider~~. divider, and

Please **add** a new paragraph at **page 5, after line 13**, as follows:

Fig. 3: a schematic illustration of a signal processing circuit according to a third embodiment with the PLL synchronization circuit and the high frequency generator arranged on the stator side.

Please **add** a new heading at **page 5, above line 14**, as follows:

DETAILED DESCRIPTION OF PREFERRED EXAMPLE EMBODIMENTS OF THE INVENTION

Please **replace** the paragraph at **page 5, line 21 to page 7, line 6**, with a replacement paragraph amended as follows:

The signal processing circuit 1 is part of an arrangement for the torque measurement of rotating machine parts, which

is provided on a rotor for the detection or acquisition of torque signals, ~~[[is]]~~ which are converted into frequency modulated measurement signals and these are transmitted inductively and without contact to a stator for the measurement signal evaluation. For this purpose, torque transducer or pick-up elements in the form of strain gages are applied on a rotor and are circuit-connected to form a Wheatstone bridge and produce measurement signals as analog torque signals, which are proportional to the detected torque. These analog measurement signals at the output of the torque measurement bridge 2 are amplified in a conventional amplifier circuit 3 and are then provided to a voltage-frequency converter 4, which converts the analog measurement signals into a continuously variable frequency. In conventional voltage-frequency converters, the dynamic or time behavior thereof is determined only by RC-elements, which comprise linearity errors and are temperature dependent, and thus partially cause zero or null point and sensitivity errors through this frequency conversion. Therefore, a so-called synchronous voltage-frequency converter (SFU) 4 is provided for the inventive signal processing circuit 1. This synchronous voltage-frequency converter, instead of the time-determining RC-elements, requires a quartz-stabilized constant input frequency that is supplied from a quartz-controlled generator circuit 5. This quartz-controlled generator circuit 5 produces a constant input frequency in the form of rectangular pulses with a frequency of, for example, 200 kHz. In that regard,

the analog measurement signal is compensated through a current of constant charge pulses, which are respectively generated in phase with the applied quartz frequency. This synchronous voltage-frequency converter 4 provides an accuracy that is one to two powers of ten higher relative to conventional frequency converters with time-determining RC-elements. This synchronous voltage-frequency converter 4 thus enables the construction of rotor electronics as signal processing circuits 1 with very high accuracies and resolutions.

Please **replace** the paragraph at **page 10, lines 3 to 27**, with a replacement paragraph amended as follows:

An improved embodiment of the signal processing circuit 1 is illustrated in Fig. 2 of the drawing. This signal processing circuit similarly contains a torque measuring bridge circuit 2, an amplifier circuit 3, a synchronous voltage-frequency converter 4 and a tracking or follow-up synchronization circuit 6, as according to Fig. 1 of the drawing. However, the synchronous voltage-frequency converter 4 is connected with a higher frequency quartz-controlled generator circuit 7, which supplies a quartz frequency in the MHz range (for example 3.2 MHz) to the synchronous voltage-frequency converter 4. Thus, in this example embodiment, the output frequency at the synchronous voltage-frequency converter 4 swings through the whole number or integer divider ratio between 1.6 MHz (0% analog signal) and 3.2 MHz (200% analog signal), in

order to produce an average frequency of 1.92 MHz. Because the quartz frequency of the high frequency generator circuit 7 corresponds to 16 times the modulation frequency of 200 kHz according to Fig. 1, the alternating frequency at the output of the synchronous voltage-frequency converter 4 also increases by the factor of 16 and thus gives rise to an alternating frequency of 640 kHz, which is then averaged by the following PLL-circuit 6 that is also of 16-fold wider bandwidth, and is thereby obtained as a frequency proportional output frequency of 1.92 MHz. Thereby, the dynamic range of the faster PLL-circuit is prescribed by switching-in correspondingly dimensioned RC-elements 8.

Please **replace** the paragraph at **page 11, line 14 to page 12, line 3**, with a replacement paragraph amended as follows:

In the signal processing circuit 15 according to Fig. 2 of the drawing, with the high frequency modulation voltages of over 3 MHz, embodiments are also possible, e.g. in a further embodiment of a circuit 16 as shown in Fig. 3, in which the synchronous voltage-frequency converter 4 is further arranged on the rotor side 14, while the tracking or follow-up synchronization circuit 6 is provided after the transmitter circuit 12 on the stator side 13. Thereby, advantageously, also unfavorable additional jitter interferences in the frequency transmission from the rotor to the stator are substantially avoidable, whereby the measurement accuracy is increased. Similarly, also the

frequency stabilized carrier frequency can be produced in the high frequency generator circuit 7 arranged on the stator side 13 and can be provided to the synchronous voltage-frequency converter circuit 4 via the supply power transmitter. This carrier frequency can then simultaneously be used for the synchronization of the stator-side pulse former stages, whereby a jitter-free, i.e. measurement error free, transmission is made possible without great effort or expense.

**[RESPONSE CONTINUES ON NEXT PAGE]**